

THE GENUS XEROPHLŒA IN NORTH AMERICA
(Homoptera, Cicadellidæ)

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The genus *Xerophlœa*, erected by Germar in 1839, is one of the genera in the subfamily Gyponinæ. The members of the genus may be characterized as follows:

Medium sized or large leafhoppers, with ocelli on flattened vertex and closer to caudal than cephalic margin, vertex with margins acute; whole dorsal surface distinctly and coarsely pitted with pits bearing minute setæ; elytra more vertical than in *Gypona*. Color of females, except in a few cases, nearly uniformly green; males green or varying through yellowish to brown, with vertex and pronotum frequently marked with dark brown and veins of elytra frequently appearing mottled. In both sexes small dark spots occur on margins of veins in caudal half of elytra and sometimes over other parts of the body. Female ventral segment long, posterior margin bilobed, with narrow median slit extending nearly to base. Last ventral segment of male long, hiding valve; plates long and finger-like, extending to tip of pygofer.

The uniform coloration of the species and the very great similarity of the genitalia are undoubtedly responsible for the fact that hitherto but two species, *X. viridis* Fabricius and *X. major* Baker, have been recognized in the United States. Both the external and the internal genitalia are so similar in the species studied that, although they sometimes show small characteristic differences, it would be impossible to use them as diagnostic characters of certain value.

Through the kindness of Mr. E. P. Van Duzee, who has loaned us the material from the California Academy of Sciences and his own private collection, and through the collections of the past several summers in the south by Dr. R. H. Beamer of the University of Kansas and his survey party, a large number of specimens of the genus from California to Florida were made available for study. In addition, many specimens from northern states were available, so that the present study

¹ Contribution from the Department of Entomology, University of Kansas.

was made from ample material from nearly every part of the United States.

In spite of the fact that two of the chief characters used in taxonomic work with leafhoppers, namely color and genitalia, are of little or no value in this genus, it was soon found that the shape of the vertex and the degree of inflation of the front are very valuable and dependable characters. These, along with size and geographical distribution, were found to be sufficient to enable a proper differentiation of the several species. As a consequence eleven new species are here described, a number of which have undoubtedly been previously included in *X. viridis*.

Following is an artificial key for the separation of the species:

KEY TO SPECIES

1. Front distinctly inflated..... 2
Front at most but slightly inflated..... 6
2. Female with entire dorsal surface spotted with brown.....
.....*brunnea*, n. sp.
Females uniformly green..... 3
3. Vertex of female at most about half length of pronotum..... 4
Vertex of female distinctly more than half length of pronotum 5
4. Front very strongly inflated; vertex shorter.....*inflata* n. sp.
Front less strongly inflated; vertex longer.....*robusta* n. sp.
5. Larger, more robust species, females over 6 mm.....
.....*vanduzeei* n. sp.
Smaller, more slender species, females under 6 mm.....
.....*californica* n. sp.
6. Vertex broadly rounded*major* Baker
Vertex distinctly angulate 7
7. Males not at all greenish..... 8
Males definitely greenish or yellowish green..... 9
8. Males robust, ashy gray, strikingly dotted with dark brown
.....*oraclis* n. sp.
Males very slender, cream-colored, strongly marked with
brown spots and lines.....*tenuata* n. sp.
9. Larger species, females usually over 7 mm.....*majesta* n. sp.
Smaller species, females usually under 7 mm.....10
10. Vertex of female nearly as long as pronotum.....11
Vertex of female distinctly shorter than pronotum.....12
11. Vertex of female longer, sides straighter, apex more obtuse
.....*obtusa* n. sp.
Vertex of female slightly shorter, sides more convex, apex
more acute*zionis* n. sp.

12. Species smaller, females under 6 mm.....*minor* n. sp.
 Species larger, females 6-7.5 mm.....*viridis* (Fabr.)

Xerophlœa zionis Lawson, n. sp.

Figs. 11, 11a

Close to *X. viridis* but with longer vertex. Length, female, 6.5 to 7 mm.; male, 6 mm.

Head slightly narrower than prothorax; vertex one-third wider between the eyes than long, anterior margins distinctly convex, apex obtusely angulate; front slightly inflated. Pronotum one-fourth longer than vertex, anterior margin moderately convex.

Color: Females uniformly bright green above except for brownish eyes and ocelli; below more yellow, with tibiæ and tarsi bright green. Males yellowish green; vertex with median, longitudinal brown stripe; pronotum with posterior half and middle third of anterior half brownish.

Holotype, female, Zion National Park, Utah, August 13, 1929, Paul W. Oman. *Allotype*, male, same data, R. H. Beamer. *Paratypes*, a female, same data, Paul W. Oman; three females and a male, same data, R. H. Beamer; a female, Pine View, Utah, July 21, 1922, E. P. Van Duzee.

Last paratype in collection of California Academy of Sciences; all other types in Snow entomological collection.

Xerophlœa vanduzeei Lawson, n. sp.

Figs. 5, 5a

Close to *X. zionis* but with narrower head and front more definitely inflated. Length, female, 6 to 6.5 mm.; male, 5.5 mm.

Head distinctly narrower than prothorax; vertex one-third wider between the eyes than long, anterior margins nearly straight, apex obtusely but strongly angulate; front definitely inflated. Pronotum one-third longer than vertex, anterior margin strongly convex.

Color: Females uniformly bright green above except for brownish eyes and ocelli; yellowish green below. Males straw yellow or greenish yellow; median longitudinal line on vertex, posterior half and median third of anterior half of pronotum, small spots on veins and larger ones along claval suture, brown.

Holotype, female, and *allotype*, male, San Jacinto Mountains, California, July 21, 1929, R. H. Beamer. A large series of *paratypes*, taken largely by E. P. Van Duzee and R. H. Beamer, are at hand from the following localities in California: San Jacinto Mountains, Lemon Grove, San Diego County, Pittsburg, Niles Canyon, San Mateo, Lake Tahoe, Coachella

Valley, Mill Creek Canyon, Cazadero, San Francisco, Marin County, Cayton, Poso Creek, Selma, Potholes, Alameda County.

Twenty-four paratypes in collection of California Academy of Sciences; all other types in Snow entomological collection.

The writer is glad to name this species in honor of Mr. E. P. Van Duzee, through whose generous loan of material this study was made possible.

Xerophlœa obtusa Lawson, n. sp.

Figs. 8, 8a

Allied to *X. vanduzeei* but with longer and more obtusely pointed vertex. Length, female, 6.5 to 7 mm.

Head definitely narrower than pronotum; vertex four-fifths as long as width between eyes, margin very thin, apex broadly and obtusely rounded; front nearly straight. Pronotum slightly longer than vertex, anterior margin moderately convex.

Color: Yellowish green except for pink ocelli and brown eyes; elytral veins often with white spots. Underside more strongly yellow.

Holotype, female, San Jacinto Mountains, California, July 21, 1929. *Paratypes*: Orange County, California, July 14, 1929; San Jacinto Mountains, California, July 21, 1929; Laguna Mountains, California, July 6, 1929. All four type specimens taken by R. H. Beamer.

All types deposited in Snow entomological collection.

Xerophlœa minor Lawson, n. sp.

Figs. 6, 6a

A small robust species, allied to *viridis*, but stouter. Length, female, 5 to 6 mm.; male, 5 mm.

Head definitely narrower than pronotum; vertex about two-thirds as long as width between eyes, anterior margins nearly straight, apex obtusely angulate; front slightly but definitely inflated. Pronotum one-third longer than vertex.

Color: Females uniformly bright green above except for pink ocelli and brown eyes; underside more yellowish. Males usually yellowish green with usual brown line on vertex, disc and posterior half of pronotum and spots on claval suture, brown. Some specimens straw yellow, more strongly marked with brown on vertex, pronotum, scutellum, and spots on veins of elytra.

Holotype, female, Hidalgo County, Texas, July 31, 1928, R. H. Beamer. *Allotype*, male, Hidalgo County, Texas, July 28, 1928, R. H. Beamer. *Paratypes*, a large series from the

following localities: Cameron, Boogie, Hidalgo, Harris, and Orange counties, Texas; Beaugard and Natchitoches counties, Louisiana; Biloxi, Agricultural College, Mississippi; Fort Pierce, Fruitville, Key Largo, Hilliard, Florida; Polk County, Arkansas.

Four paratypes deposited in collection of California Academy of Sciences; all other types in Snow entomological collection.

Xerophlœa californica Lawson, n. sp.

Figs. 3, 3a

Allied to *X. vanduzeei* but smaller, with front more strongly inflated and vertex relatively longer. Length, 5.5 to 6 mm.

Head very slightly narrower than pronotum; vertex about three-fourths as long as width between eyes, anterior margins slightly convex to obtusely angulate apex; front broadly and strongly inflated. Pronotum about one-third longer than vertex, anterior margin moderately convex.

Color: Varying from bright to yellowish green, often with small black dots all over surface; elytral veins sometimes spotted with brown.

Holotype, female, San Diego County, California, July 4, 1929, P. W. Oman. *Paratypes*, two same data; two others, San Jacinto Mountains, California, July 21, 1929, R. H. Beamer.

Types deposited in Snow entomological collection.²

Xerophlœa brunnea Lawson, n. sp.

Figs. 4, 4a

Allied to *X. californica*, but females are brown and vertex distinctly shorter. Length, female, 5.5 to 6 mm.

Head nearly as wide as pronotum; vertex very wide, about two-thirds as long as width between eyes, margins convex to obtuse apex; front strongly inflated. Pronotum about one-third longer than vertex.

Color: Dirty yellow, spotted all over with tiny brown dots, giving it a distinctly brownish appearance.

Holotype, female, and a *paratype*, Orange County, California, July 14, 1929, R. H. Beamer.

Types deposited in Snow entomological collection.

² Note by the editor: The following additional specimens of this species were returned by Professor Lawson to the California Academy of Sciences labeled "Paratypes": Keen Camp, Riverside County, California, June 6, 1917 (Van Duzee); Alpine, San Diego County, California, October 4, 1913 (Van Duzee); same place, September 13, 1923 (Van Duzee); San Diego County, California, April 8, 1925 (Van Dyke), Selma, Fresno County, California, June 4, 1929 (Van Duzee).

This is the only species in the genus yet known in which the females depart entirely from the usual uniform green coloration and assume the color of some of the darker males.

Xerophlœa robusta Lawson, n. sp.

Figs. 2, 2a

A very stout species allied to *X. brunnea* but more robust and with front more strongly inflated. Length, female, 6 to 6.5 mm.; male, 5.5 mm.

Head distinctly narrower than pronotum; vertex nearly twice as wide between eyes as long, apex well rounded, very slightly, if at all, angulate, slightly upturned apically; front very strongly inflated. Pronotum nearly twice as long as vertex and very wide.

Color: Females uniformly bright green except for pink ocelli and brown eyes; males straw yellow with brown stripe on middle of vertex, disc and posterior half of pronotum and spots on suture of elytra, brown.

Holotype, female, Hidalgo County, Texas, July 28, 1928, R. H. Beamer. *Allotype*, male, Culberson County, Texas, July 12, 1927, L. D. Anderson. *Paratypes*: Chaves County, New Mexico; Hidalgo County, Texas; Nogales, Oracle, Patagonia, and Navajo and Yavapai counties, Arizona.

Six paratypes in collection of California Academy of Sciences; holotype, allotype, and six paratypes in Snow entomological collection.

Xerophlœa inflata Lawson, n. sp.

Figs. 1, 1a

Closely related to *X. robusta*, but with shorter vertex and even more inflated front. Length, female, 6 mm.; male, 5 mm.

Head distinctly narrower than pronotum; vertex fully twice as wide between eyes as long, anterior margin nearly rounded; front very strongly inflated. Pronotum fully twice as long as vertex, very wide.

Color: As in *X. robusta*.

Holotype, female, Brooks County, Texas, July 25, 1928, L. D. Anderson. *Allotype*, male, Tucson, Arizona, June 21, 1924, A. A. Nichol. *Paratypes*: Mescal, Tucson, Oracle, Huachuca, and Yavapai County, Arizona, and Palm Springs, California.

Four paratypes in collection of California Academy of Sciences; holotype, allotype, and four paratypes in Snow entomological collection.

Xerophlœa majesta Lawson, n. sp.

Figs. 9, 9a

Allied to *X. major* but not so robust and with angulate vertex. Length, female, 7 to 8 mm.; male, 6.5 to 7 mm.

Head distinctly narrower than pronotum; vertex nearly one-third wider between eyes than long, margins very thin, apex obtusely but distinctly angulate; front nearly straight. Pronotum distinctly longer than vertex, quite wide.

Color: Females uniformly bright green except for pink ocelli and brown eyes. Males straw yellow, usually well marked with brown on middle line of vertex, brown spots all over pronotum, and elytral veins alternating with white and brown spots.

Holotype, female, Douglas County, Kansas, trap light, July 10, 1930, Paul B. Lawson. *Allotype*, male, same data except taken on July 20. *Paratypes:* Douglas and Greenwood counties, Kansas; Hidalgo, Jim Wells, Palopinto, Bee, Kendall, Cameron, and Brooks counties, Austin and Galveston, Texas; Vicksburg, Mississippi; Clemson College, South Carolina.

Five paratypes in collection of California Academy of Sciences; holotype, allotype, and large series of paratypes in Snow entomological collection.

Xerophlœa oraclis Lawson, n. sp.

Figs. 10, 10a

Allied to *X. minor* but with more angulate vertex and more strongly marked with dark brown. Length, male, 5.25 mm.

Head distinctly narrower than pronotum; vertex nearly one-half wider between eyes than long, anterior margins straight, apex strongly angulate; front slightly inflated. Pronotum one-half longer than vertex, wide.

Color: Nearly ashy gray, strikingly marked with dark brown as follows: On middle third of vertex and scattered spots on lateral thirds, along anterior third to half of pronotum, and narrow band along posterior margin, two large spots on scutellum, many small spots on clavus, and particularly bordering elytral veins. Most of face brown and entire underside with many small brown dots.

Holotype, male, Oracle, Arizona, July 28, 1924, E. P. Van Duzee.

Type in collection of California Academy of Sciences.

Xerophlœa tenuata Lawson, n. sp.

Figs. 7, 7a

Perhaps closest to *X. viridis* but much more slender and vertex much longer. Length, male, 6 mm.

Head slightly narrower than pronotum; vertex nearly as wide between eyes as long, margins nearly straight to distinctly angulate apex; front straight. Pronotum but slightly longer than vertex.

Color: Background straw yellow to creamy yellow, heavily marked with brown. Vertex creamy yellow with three more or less distinct brown longitudinal stripes. Pronotum creamy yellow, irregularly irrorate with brown. Elytra straw yellow, with large brown spots on claval suture and veins strongly spotted with brown. Whole insect appearing strongly brown, above and below.

Holotype, male, San Diego County, California, October 17, 1913, E. P. Van Duzee.

Type in collection of California Academy of Sciences.

This species is by all odds the most slender member of the genus.

XEROPHLÆA VIRIDIS (Fabricius)

Figs. 12, 12a

Cercopis viridis Fabricius, Ent. Syst., iv, p. 50, 1794.

Xerophlæa grisea Germar, Zeits. f. Ent., i, p. 190, 1839.

Xerophlæa virescens Stål, Of. Vet. Akad. Forh., xi, p. 253, 1854.

Parapholis peltata Uhler, Bul. U. S. Geol. Geog. Surv., iii, p. 461, 1877.

A comparatively slender species. Length, female, 6.5 to 7.5 mm.; male, 5.5 to 6.5 mm.

Head slightly narrower than pronotum; vertex about three-fifths as long as width between the eyes, margins slightly convex to definitely angulate apex; front nearly straight. Pronotum at least one-half longer than vertex.

Color: Females light green, often with minute black dots, especially along elytral veins. Males yellowish green, usually with median line on vertex, disc and posterior half of pronotum, brown. In rare cases males are gray, with additional brown markings on vertex and pronotum and many brown spots on elytra, so that entire insect appears distinctly brown.

This species has been recorded from a number of states scattered over the whole area of the United States. In addition to those mentioned in Van Duzee's catalogue, the writer has before him specimens from Montana, Arizona, and New Mexico.

In the light of the distribution of the new species here described, there is some doubt in the writer's mind as to whether all the specimens called *viridis*, having as they do such a wide range of distribution, are really but one species. Moreover, there seem to be some differences in the vertex and front of specimens from various parts of the country. However, the

writer has not been able to differentiate clearly enough the specimens from the several regions, and thinks it best to put under this name all the forms here included. In distribution, therefore, this species may be said to cover the United States.

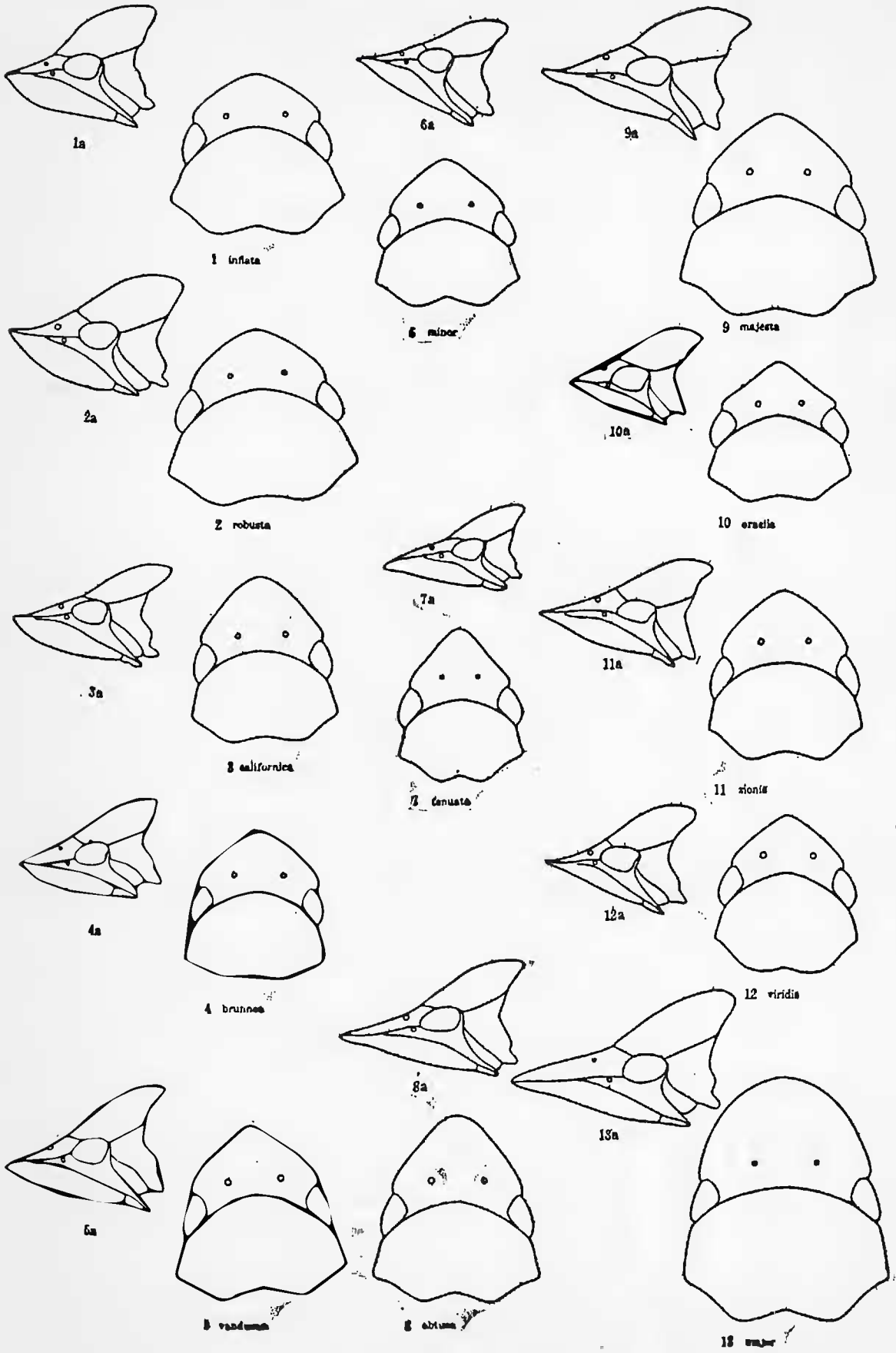
The original description of *X. viridis* does not set aside this species from many of the others, and the writer has not seen the type specimen. However, as now understood, the range of this species extends to the type locality, the original description fits it as well as any of the others, and commonly accepted usage would seem to make it advisable to continue the name for the forms described above. However, an examination of the type, if available, may show that this name is applied to the wrong species. In this case it is more than likely that the name *viridis* should apply to the species which the writer has named *minor*.

Germar undoubtedly had before him a male of this species when he described *grisea*, and Stål was most liable to have had a specimen of this, the commonest species, before him when he described *virescens*. Uhler described *peltata* from Colorado. This is undoubtedly a synonym for *viridis* because so far this is the only species recorded from that state.

Dr. Myron H. Swenk of the University of Nebraska recently told the writer that he had several records of the swarming in immense numbers of a species of Xerophloea. He was kind enough to send the writer a number of specimens taken at the time of swarming, and these proved to be *viridis*. It is questionable whether anyone had ever before heard of any species of Xerophloea occurring in anything like such tremendous numbers and, therefore, we are, through the courtesy of Dr. Swenk, quoting reports of a number of occasions when this species occurred in great swarms:

From Neligh *Leader* (Nebraska), October 1, 1920:

"The 11th day of September was unique in that the city of Neligh was visited by a cloud of the little green bugs, and windows other than mine were clouded with them and houses and stores were closed to shut them out. One of my friends set a small can under the electric light at the intersection of Main and Putney streets which was nearly filled by those which were killed and dropped. All the stores were closed and it was quite a chore next morning to sweep up the thousands that were caught when the stores were closed."



Mr. H. E. Zimmerman, O'Neill, Nebraska, wrote on September 17, 1920:

"Please find enclosed envelope containing portion of bugs which swarmed into our streets a few days ago. These pests swarmed in and formed about two inches thick all over the sidewalks on the west side of buildings. We are interested, as the farmers here are inquisitive."

Mr. John S. Marsh, Guide Rock, Nebraska, wrote on September 21, 1924:

"I am mailing you a sample of bugs that made their appearance last night. One could have swept up a bushel of them in buildings and on the sidewalks. What are they?"

It is evident from the above, that on occasion at least, this species must be considered as one of the more important leaf-hoppers.

XEROPHLÆA MAJOR Baker

Figs. 13, 13a

Xerophlæa major Baker, Psyche, viii, p. 285, 1898.

A large stout species with rounded vertex. Length, 7.5 to 8 mm.

Head slightly narrower than pronotum; vertex two-thirds to three-fourths as long as width between eyes, anterior margin broadly rounded; front in profile nearly straight. Pronotum but slightly longer than vertex.

Color: Female bright green, frequently well spotted with minute black dots.

This species is unique in its rounded vertex and general robustness. Van Duzee in his catalogue lists it from New York, New Jersey, Virginia, and Tennessee. The writer has before him a specimen from Cherokee County, Kansas.

THE ODONATA OF CHINA

Students of the Odonata will be interested in Dr. James G. Needham's Manual of the Dragonflies of China, published in Peiping as fasc. I of Vol. II of Zoölogica Sinica, Ser. A., issued October 1, 1930. Keys are given to the higher taxonomic units as well as to the genera and species, and adequate descriptions are given for all. Full accounts of the preparatory stages are included when they are known, and notes on distribution. A total of 89 genera and 266 species are treated in the 344 quarto pages and 20 plates. The work is entirely in the English language. Apparently the Odonata are a dominant group in China.
—E. P. Van Duzee.